

Enter and work in confined spaces

RIIWHS202D



- By the end of this topic, you should be able to:
 - Plan and prepare for working in confined space
 - Work in confined space
 - Exit confined space
 - Conduct housekeeping activities

- Safe Work Method Statements (SWMS)
 - SWMS assist a PCBU to consider how certain activities will be carried out safely. The following should be noted:
 - SWMS must be easy to understand, signed and dated;
 - SWMS must be amended if there is a change in the activity and a copy must be given to the principal contractor;
 - All persons affected by changes must be advised of amendments to the work method statement.
- Job Safety Analysis (JSA)
 - A job safety analysis is a procedure which helps integrate accepted safety and health principles and practices into a particular task or job operation. In a JSA, each basic step of the job is to identify potential hazards and to recommend the safest way to do the job.
 - Identifies hazards and potential hazards that may be encountered while working

- Safety Data Sheet

- An SDS – previously called material safety data sheet (MSDS) - provides information which allows for the safe handling and use of substance/materials in the workplace.
- It describes:
 - The identity of the product e.g. formulation or chemical name
 - The properties and uses of the product
 - Health hazard information precautions for use
 - Safe handling information
 - First aid instructions
 - Methods for safe disposal
 - Identify materials/substances that the product is incompatible with
- It is important that all waste material is removed from the construction site. This may include:
 - construction materials, oils and fuel, garbage materials such as empty containers, wrappings, excavated soils and rock

Plans

- Before commencing any job, you will usually receive specific work instructions which will include plans.
- The main purpose of plans is to provide a visual representations of the work to be undertaken. If there are hazards and discrepancies between plans and what is on site, a site manager, supervisor or project manager should be notified.

- Site safety plan
 - A WHS management [safety] plan sets out the arrangements to manage work health and safety on a construction project. The intention of a WHS management plan is to ensure the risks associated with a complex construction project are managed, as there are usually many contractors and subcontractors involved and circumstances can change quickly from day to day
- Environmental Management Plan (EMP)
 - An Environmental Management Plan (EMP) is a site or project specific plan developed to ensure that appropriate environmental management practices are followed during a project's construction and/or operation.
 - Addresses clean up management, noise control and waste management.

Identifying a confined space

- Identification of a confined space is perhaps the most important task with confined space activities. Successfully identifying a confined space will enable workers to assess the risks associated with that space.
- Confined spaces may or may not have a restricted means of entry and exit. A confined space should have an appropriate entry and exit point to allow for the safe entry and exit or retrieval of persons in an emergency.
- A confined space is not designed to be a primary place of work.
- Examples of confined spaces can include storage tanks, process vessels, boilers, and silos, also included can be pipes, sewers, shafts, sullage pits, ducts, and similar structures.



Man holes



Pipes



Tanks



Sewers

Confined space entry permit

- A confined space entry permit provides a formal check to ensure all elements of a safe system of work are in place before people are allowed to enter the confined space. It also provides a means of communication between site management, supervisors and those carrying out the work and ensures that the person conducting the business or undertaking has checked and authorised the entry to the confined space and it is safe to proceed.
- An entry permit should be revalidated when there is a change in work procedures, an introduction of new plant to the space or when the original time set on the permit has expired.

Confined space entry permit

- When establishing an entry point permit and emergency procedures, the following factors must be taken into account to manage risks associated with confined spaces:
 - Whether the work can be carried out without the need to enter the confined space
 - The nature of the confined space
 - Any changes in hazards associated with the concentration of oxygen or the concentration of airborne contaminants in the confined space
 - The work to be carried out in the confined space, the range of methods by which the work can be carried out and the proposed method of working
 - The type of emergency and rescue procedures required



Entry permit requirements

- For the entire period the confined space entry permit is valid, procedures should be in place to indicate when any worker is in the space, for example by using tags, a system of signing in and out on the entry permit, or having a standby (spotter) person record who is in the space.

Entry permit requirements

- Proper maintenance of control measures is an integral part of any safe system of work. Maintenance may involve visual checks, inspections, testing of equipment, preventative maintenance and remedial work. Equipment that should be regularly inspected includes:
 - Atmospheric testing and sampling equipment
 - Personal protective equipment including respirators
 - Ventilation equipment
 - Safety harness and lines
 - Emergency rescue equipment
- Prior to entry to a confined space a Risk Assessment and Atmospheric testing must be completed.



Hot work permits

- Under no circumstances are hot works to be carried out in a confined space known to support a contaminated atmosphere.
- In some situations a Hot Work Permit may be required for work undertaken in a confined space.
- The Australian Standard defines hot work as:
 - Welding;
 - Thermal or oxygen cutting; and
 - Heating
- Ensure that all the necessary arrangements are in place should a Hot Work Permit be required.



Tools and equipment

- Confined space entry will require several types of equipment designed for safety within the space. Among these will be walkie talkies, gas monitor (atmospheric tester) tripods, safety harness and life lines.
- Other equipment can include breathing apparatus and PPE required for the task undertaken. Also included will be signage and barricades at the entrance to the space. Equipment should be inspected prior to and upon exiting a confined space.

Tools and equipment

TOOL	DEFINITION
Gas Detectors	Gas detectors can also be called atmospheric detectors or monitors. Monitors are designed to indicate an atmosphere that may prove harmful or fatal to persons within the space. Most of these monitors will have specific readings for the oxygen levels (19.5%-23.5%), carbon monoxide and hydrogen sulphide. Gases such as methane will also register but it will be shown as an explosive gas (LEL). Air monitors should be calibrated in a fresh air environment.
Breathing Apparatus	Breathing apparatus is worn when an environment has an atmosphere that is unsafe for human occupation. This can be where the oxygen content is below 19.5% or where there may be airborne contaminants within the space. The type of breathing apparatus will depend on the results of an atmospheric reading. Any person using self-contained breathing apparatus will need to be fully trained in correct use of that equipment. The equipment must be correctly maintained and it should fit the user so there is no chance of gas entering the face mask. It is recommended that persons using this equipment are clean shaven to prevent gas seeping through.

Tools and equipment: Maintenance and inspections

- It is also essential that that tools and equipment are checked for serviceability, and any faults are rectified or reported prior to commencement. This requires you to follow all workplace protocols for rectification and reporting applicable to your organisation. These protocols will require you to complete forms, place signage on equipment, and report faults to supervisors.
- Remember: before you use any equipment identify if there is a maintenance schedule, ensure that there are no discrepancies and that it is signed off.

Tools and equipment: Defective equipment protocol

DANGER

DEFECTIVE EQUIPMENT

SIGNED BY: _____

DATE: _____

DANGER

DO NOT REMOVE THIS TAG!

TO DO SO WITHOUT AUTHORITY WILL MEAN DISCIPLINARY ACTION!
IT IS HERE FOR A PURPOSE

REMARKS: _____

SEE OTHER SIDE

STOP

1

TAG

2

REPORT

3

RECORD

4

Personal Protective Equipment (PPE)

- For undertaking work in confined spaces - head, eyes and face, hands, feet and body protection need to be worn.
 - Head - safety helmets, sun hats;
 - Eyes/face- safety spectacles, goggles, face shields;
 - Hearing- ear muffs, ear plugs;
 - Airways/lungs- dust masks, respirators;
 - Hands- gloves, barrier creams;
 - Feet- safety boots, rubber boots;
 - Body- clothing to protect from the sun, cuts, abrasions and burns
 - Harness/lifelines



Communication system

- A communication system is needed to enable communication between people inside and outside the confined space and to summon help in an emergency.
- Depending on the conditions in the confined space, communication can be achieved by voice, radio, hand signals or other suitable methods. Continual contact must be maintained between the standby person and those inside the confined space.

COMMUNICATION EXAMPLE

If you are feeling drowsy, notify the standby person as to your exit and leave the confined space as soon as possible.

Communication system

- The standby (spotter) person should:
 - Understand the nature of the hazards inside the particular confined space and be able to recognise signs and symptoms that workers in the confined space may experience
 - Remain outside the confined space and do no other work which may interfere with their primary role of monitoring the workers inside the space
 - Have all required rescue equipment (for example, safety harnesses, lifting equipment, a lifeline) immediately available near the confined space entry.
 - Have the authority to order workers to exit the space if any hazardous situation arises
 - In the event on an emergency the initial response for the spotter should be to raise the alarm.
 - Never enter the space to attempt rescue.
 - Have access to the SDS for any chemicals being used
 - Hot Work permits
 - Have access to Safe Work Method Statements.

The standby (spotter) person is to monitor and adhere to entry/exit times as workers ARE NOT to exceed allocated timeframes working in the confined space. This will allow persons outside the space to know exactly how many persons are in the space. This information is vital in the case of an emergency.

Signage and barrier requirements

- Before any work in relation to a confined space starts, signs must be erected to prevent entry of persons not involved in the work.
- Signs must warn against entry by people other than those who are listed on the confined space entry permit, and must be placed at each entrance to the confined space. Signs must be in place while the confined space is accessible, including when preparing to work in the space, during work in the space and when packing up on completion of the work.

- Consider and plan carefully for the placement of signage and barricades:
 - Position them where they are clearly visible to all concerned, easily read, and can attract attention. If lighting is not adequate, illuminated signs can be used;
 - Ensure that regulation and hazard-type signs are positioned in relation to the hazard to allow a person plenty of time to view the sign and take notice of the warning.
 - Take care where several signs are intended to be displayed close together.

Signage and barrier requirements



- Testing and monitoring the atmosphere in a confined space is a routine part of determining appropriate control measures.
- The purpose of atmospheric testing is to test the condition of the environment within the space for:
 - Oxygen Deficiency below 19.5%
 - Oxygen Excess above 23.5%
 - Flammability above and below 5% of the lower explosive limit
 - Toxicity below relevant levels

- Any air monitoring testing in a confined space should be carried out by a competent person using a suitable, correctly calibrated gas detector.
- It may be necessary to test the atmosphere for:
 - Oxygen content
 - Airborne concentration of flammable contaminants
 - Airborne concentration of potentially harmful contaminants (for example, hydrogen sulphide and carbon monoxide)

- Purging is done using an inert gas, such as nitrogen, to clear flammable gases or vapours before work in the confined space begins. After purging, the confined space should be adequately ventilated with sufficient fresh air to ensure that the inert gas is removed. A hazardous area is an area in which an explosive atmosphere is present, or may be expected to be present, in quantities that may require special precautions for the construction, installation and use of potential ignition sources. The WHS Regulations prohibit pure oxygen or gas mixtures with oxygen in concentration greater than 21% by volume being used for purging or ventilating a confined space because of the risk of increased flammability.

Atmospheric testing and monitoring: Ventilation

- Ventilation of a confined space with fresh air, by natural, forced or mechanical means, may be necessary to establish and maintain a safe atmosphere and temperature for as long as anyone is in the confined space. If the confined space has sufficient openings then natural ventilation may be adequate, but in most cases mechanical ventilation is likely to be needed, which is determined by initial testing showing an unsafe atmosphere.
- Consideration should also be given to where the fresh air is drawn from and where the exhaust air is finally vented to, so that the fresh air is not contaminated either by exhaust air or by other pollutants, and the exhaust air does not cause other risks. Mechanical ventilation may be either local exhaust ventilation (LEV) or dilution ventilation. LEV is effective where the source of contaminant generation is localised, the extraction point can be located close to the source and adequate make-up air is available (for example, capture or extraction of welding fume).

REMEMBER

A person conducting a business or undertaking must, while work is being carried out in a confined space, ensure that the concentration any flammable gas, vapour or mist in the atmosphere of the space is less than 5% of its LEL, so far as is reasonably practicable.

- Correctly apply tagging and lock-out procedures.
 - All potentially hazardous services should be isolated prior to any person entering the confined space.
- Isolate to prevent:
 - The introduction of contaminants or conditions through piping, ducts, vents, drains, conveyors, service pipes and fire protection equipment
 - The activation or energising of machinery in the confined space
 - The activation of plant or services outside the confined space that could adversely affect the space (for example heating or refrigerating methods)
 - The release of any stored or potential energy in plant
 - The inadvertent use of electrical equipment.

Isolation, tagging and lock-out

- If liquids, gases or vapours could enter the confined space the pipe work should be physically isolated.
- Isolation measures, for example physically locking, tagging, closing and blanking (see Figure) should be supervised or checked at each isolation point. Isolation measures should be supported by systems to ensure that the isolation measures are not removed until all work is complete and all workers have left the space.



Exit confined space

- To facilitate exit from a confined space, it is essential to have a proper retrieval system for both workers and equipment. Exiting is to be conducted in accordance with agreed procedures. This will include but not limited to, ensuring all workers have exited using systems such as:
 - Tags.
 - Signing in and out record.
- The lead worker will determine when the entry operations have been completed.

Exit confined space

- It is essential to have a proper retrieval system for equipment when exiting a confined space.
- Exiting is to be conducted in accordance with agreed procedures.
- All equipment used to conduct work in a confined space should be recorded when checked in, and verified when checked out on exit.



Exit confined space: Conduct inspection

- Many sites appoint a confined space coordinator to ensure the project is appropriately conducted.
 - The confined space coordinator ensures:
 - All personnel are clear of the area.
 - Equipment has been removed.
 - Confined space is cleaned to its original state.
 - Manage the securing of the confined space and returning the tags and locks.
 - Conduct a final inspection in conjunction with OIC/ site manager and sign off the final securing of the confined space



- It is imperative that after exiting the confined space that securing access to the space be finalised in accordance with site procedures. Individual sites may have varying procedures however, listed below are the generally accepted requirements.
 - The entry permit will be closed out by listing the time of space exit and any other pertinent information.
 - The rescue service will be notified that the entry is complete.
 - The entry closure will be replaced.
 - Ensure all parties have left the confined space.

- Lockout-tag out or lock and tag is a safety procedure which is used in industry and research settings to ensure that dangerous machines are properly shut off and not started up again prior to the completion of maintenance or servicing work. It requires that hazardous power sources be "isolated and rendered inoperative" before any repair procedure is started.
- Many sites have the officially stated policy that only the person who tagged the device can untag it. This means that if a worker goes home after their shift without removing the tag from a device which is ready to use, then they will have to travel back to the site to untag it. Giving approval for the removal of a tag over the phone is prohibited.

Exit confined space: Complete confined space entry permit

- When all work has ceased within the space the written authority must be closed (signed off).
- Before the authority is closed the confined space must be inspected to ensure the work is finished. Then all tools and equipment must be removed from the space. The confined space should be sealed off stopping any unauthorised personal entering the space.
- All persons who were in confined space must sign the written authority signalling that they have left the space. Once this has been achieved then the written authority must be returned to the issuing authority.
- If at any time persons must enter that space again then a new permit will need to be issued.

Cleaning work area

- Clear work area and dispose of or recycle materials in accordance with project environmental management plan.
- Cleaning up correctly is just as important as any other task involved in construction.
 - Cleaning up means all debris and waste materials must be collected and removed to the waste storage area and sorted for recycling.
 - Unused materials must be cleaned and returned to the storage area and stacked or stored neatly.
 - Report faults in logbook or site records.
 - The work area must be left clean, safe and secure on completion of the task.
 - Shut down and clean all plant, tools and equipment before storage.
 - Maintain plant; tools and equipment according to the schedule, this prolongs the efficiency and longevity; to eliminate hazards or risks; ensures equipment is clean and in correct working order.

Cleaning work area

- The construction process has particular environmental impacts and mitigation options at each level of work: site establishment and setup; construction work activities; and site restoration after the completion of work.
- To guard against these environmental impacts ensure that the Environmental Management Plan is adhered to when clean-up activities are undertaken.



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